Geophysical Research Abstracts
Vol. 16, EGU2014-11715, 2014
EGU General Assembly 2014

MOZAIC-IAGOS program : 20 years of in-situ data in the UTLS

Valérie Thouret (1), Bastien Sauvage (1), Philippe Nédélec (1), Andreas Petzold (2), Andreas Volz-Thomas (2), and the IAGOS Team

(1) Laboratoire d'Aérologie, UMR 5560, CNRS and Univeristé Paul Sabatier, Toulouse, France (thov@aero.obs-mip.fr), (2) Forschungszentrum Jülich, Institute of Energy and Climate Research 8: Troposphere, Jülich, Germany

The use of commercial aircraft allows the collection of highly relevant observations on a scale and in numbers impossible to achieve using research aircraft, and in regions where other measurement methods (e.g., satellites) have technical limitations.
Since 1994, the MOZAIC program has been measuring ozone, water vapor and meteorological parameters (along with NO_y for 2001-2005 and CO since 2001) on board 5 commercial aircraft. IAGOS (In-service Aircraft for a Global Observing System, http://www.iagos.org) was initiated in 2006 and combines the experience gained within the MOZAIC and CARIBIC programs. IAGOS is now one of the new European Research Infrastructures with the objective of establishing and operating a distributed infrastructure for long-term observations of atmospheric composition (O_3, CO, CO_2, NO_y, NO_x, H_2O), aerosol and cloud particles on a global scale from a fleet of initially 10-20 long-range in-service aircraft of internationally operating airlines. Data are available in near real time for weather services and Copernicus service centres, as demonstrated in the MACC project (http://www.iagos.fr/macc). The IAGOS database is an essential part of the program and is still under development/improvement such as additional new value-added products (source-receptor link of observed pollutants) obtained by coupling the Lagrangian dispersion model FLEXPART to CO surface emissions from different inventories. Data access through http://www.iagos.fr is handled by an open access policy based on the submission of research requests.
An overview of the most recent results focusing on UTLS data will be presented, including :
- Five years of MOZAIC NO_y observations that are used to characterize and describe large-scale plumes including lightning NO_x emissions, in the upper troposphere between North America and Europe.
- Characteristics of ozone and CO distributions over regions of interest never or poorly sampled by other platforms are measured: UTLS Northern mid-latitudes thanks to 5 aircraft based in Europe flying westbound and eastbound since 1994; Transects over the African continent thanks to daily Air Namibia flights between 2006 and 2013; South Atlantic area thanks to regular flights between Europe and South America; The Asian monsoon region thanks to regular flights between Europe and the Indian-South East Asia area sampling the UT under the influence of the Asian Monsoon Anticyclone (AMA).
- Ten years of CO measurements which show an increase in concentration on moving from the Western to Eastern hemisphere. In the US, Atlantic and European sectors CO concentrations have fallen by about 2% per year.
- Almost 20 years of Ozone measurements at northern mid-latitudes showing a leveling-off of the mixing ratios for the last 10-12 years over the Atlantic sector while ozone is still increasing over Asia.
- Almost 20 years of relative humidity measurements showing that the upper troposphere (10 – 12 km altitude, which corresponds to the aircraft cruise level) is much wetter than reflected in the model analyses of the ECMWF (European Centre for Medium range Weather Forecast).